<u>**AMENDMENTS TO THE CLAIMS**</u>

This listing of claims will replace all prior versions, and listings, of claims in the application:

<u>**Listing of Claims:**</u>

1-14.   (Cancelled).

15.   (Previously Presented) A system for determining damage information of a structure, comprising:

a sensor arranged to measure vibrations of a structure having a lengthwise dimension much greater in magnitude than cross-sectional dimensions thereof and to output vibration information;

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data; and

a damage information processor for receiving said stiffness parameters and outputting damage information comprising spatial damage information on said structure, said spatial damage information comprising a damage location along said lengthwise dimension of said structure.

16.   (Previously Presented) The system according to claim 15, wherein said damage information processor outputs extent of damage information.

17-46. (Cancelled).

47.   (Currently Amended) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order eigenvalue sensitivity analysis and one of the generalized inverse method, gradient method, or quasi-Newton method,

wherein a number of system parameters is ~~less~~ <u>larger</u> than a number of system equations.

48.   (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a second or higher order perturbation process.

49.   (Currently Amended) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information and determining said stiffness parameters with an iterative processing unit;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order eigenvalue sensitivity analysis,

wherein a number of system parameters is ~~less~~ <u>larger</u> than a number of system equations.

50.   (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information and determining said stiffness parameters with an iterative processing unit;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a second or higher order perturbation process.

51.   (Previously Presented) A system, comprising:

a structure;

a sensor arranged to measure vibrations of said structure and output vibration information;

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data; and

a damage information processor for receiving said stiffness parameters and outputting location of damage on said structure.

52.   (Previously Presented) The system according to claim 51, wherein said damage information processor comprises a damage location processor for determining damage location information.

53.   (Previously Presented) The system according to claim 51, wherein said damage information processor comprises a damage extent processor for determining extent of damage information.

54.   (Previously Presented) The system according to claim 51, wherein said damage information processor comprises a damage extent processor for determining extent of damage information and a damage location processor for determining damage location information.

55.   (Cancelled).

56.   (Previously Presented) A system, comprising:

a structure;

a random impact device for introducing vibrations in said structure, said random impact device comprising,

a random signal generating unit for generating first and second outputs;

a random impact actuator for receiving said first and second outputs; and

an impact applicator coupled to said random impact actuator,

wherein said random impact actuator drives said impact applicator such that the force and arrival times of said impact applicator at said structure are random;

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data.

57.   (Previously Presented) The system of claim 56, wherein said random impact actuator drives said impact applicator in accordance with said first and second outputs.

58.   (Previously Presented) The system of claim 57, wherein the first and second outputs comprise independent random variables.

59.   (Previously Presented) The system of claim 58, wherein the first and second outputs determine the force and arrival times, respectively, of the impact applicator at said structure.

60.   (Currently Amended) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining mode shape information, and determining the stiffness parameters of said structure using said mode shape information;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order eigenvector sensitivity analysis,

wherein a number of system parameters is ~~less~~ <u>larger</u> than a number of system equations.

61.   (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining mode shape information, and determining the stiffness parameters of said structure using said mode shape information;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a second or higher order perturbation process.